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Biological aspects of *Anelosimus aulicus* (C.L. Koch, 1838) (Arachnida: Araneida: Theridiidae) in Egypt

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Abstract

The life cycle of *Anelosimus aulicus* (C.L. Koch, 1838), family Theridiidae, was studied in laboratory. It had 5 spiderling instars before adulthood for both male and female. Different instars were reared on *Tetranychus urticae*, *Aphis craccivora* or on a mixture of both of them. Prey consumption was calculated for different stages. Effect of different diets on fecundity of the spider was studied. Mating behaviour was also described.

Keywords: Life cycle, Feeding, Fecundity, Spiders, Theridiidae, *Anelosimus aulicus*, Egypt.

Introduction

Family Theridiidae is one of the big families of spiders. It includes 2199 species (79 genera), distributed all over the world. There are 45 species of genus *Anelosimus* Simon, 1891, mostly recorded from South America and South-east Asia. *Anelosimus aulicus* (C.L. Koch, 1838) is one of the few palaearctic species of this genus. It is recorded from the area between Canary Islands (Atlantic ocean) and Azerbaijan (in Asia) (Platnick, 2003). In Egypt, *A. aulicus* is recorded from: Alexandria, Nile Delta, Siwa Oasis, and Wadi Natron (El-Hennawy, 2002a & 2002b); Belbis (El-Sharqia), Ibshiway (El-Fayoum) and Sids (Beni-Suef) (Sallam, 2002).

Field observations showed that the theridiid spider *A. aulicus* was usually found in association with some economically important pests, e.g. red spider mites, aphids, white flies and thrips, especially in sweet squash plantations. So, it was necessary to study the biological aspects of this spider. Also, this study may be the entrance to a study of its behaviour to compare it with social and subsocial species of genus *Anelosimus* to get a better idea about the "gradual development of sociality" (Foelix, 1996).

Table 1: Duration of different spiderling instars (in days) of *Anelosimus aulicus* at room temperature, during different seasons, with 3 kinds of feeding.

Prey	Rearing group	Sex	Egg	Instar					Life cycle	Adult longevity	Life span
				First *	Second	Third	Fourth	Fifth			
Tetranychus urticae	A	♂	12.8 ± 1.5	18.0 ± 0.01	30 ± 10	53.5 ± 30	-	-	-	-	-
		♀	12.8 ± 1.5	20.5 ± 7.2	46.3 ± 14	76.8 ± 19	-	-	-	-	-
	B	♂	9.6 ± 2.4	12.4 ± 0.5	21.5 ± 7.5	12.1 ± 0.1	-	-	-	-	-
		♀	9.6 ± 2.4	13.75 ± 0.74	13.4 ± 3.9	12.3 ± 0.4	-	-	-	-	-
Aphis craccivora	A	♂	12.8 ± 1.5	18 ± 0.01	39.99 ± 18	26.2 ± 7.6	41 ± 22	61.16 ± 17	197.8 ± 11.1	91 ± 18	288.8
		♀	12.8 ± 1.5	26.5 ± 0.72	27.5 ± 4.3	29 ± 7.4	29.5 ± 8.2	77.5 ± 5.7	202.8 ± 4.5	191 ± 25	393.8
	B	♂	9.6 ± 2.4	12.4 ± 0.5	10.4 ± 0.75	10.8 ± 0.24	13 ± 0.87	13.45 ± 0.4	70.43 ± 0.86	60 ± 8.4	130.43
		♀	9.6 ± 2.4	13.75 ± 0.74	12.5 ± 3.2	12.3 ± 0.04	13.8 ± 0.7	17.72 ± 0.1	78.6 ± 1.19	122 ± 5	200.6
Mixed diet	A	♂	12.8 ± 1.5	18 ± 0.01	27.6 ± 5.4	21.3 ± 3.77	28.6 ± 1.8	65.3 ± 6.1	173.6 ± 3.2	85.3 ± 5.7	258.9
		♀	12.8 ± 1.5	20.75 ± 0.75	20 ± 0.01	27.6 ± 4.4	74.25 ± 24	25.33 ± 2.4	180.73 ± 5.5	160 ± 11.7	340.73
	B	♂	9.6 ± 2.4	12.4 ± 0.5	9.5 ± 0.5	10 ± 0.01	12.2 ± 0.43	13 ± 0.01	66.7 ± 1.30	73.1 ± 7.7	139.81
		♀	9.6 ± 2.4	13.75 ± 0.74	9.8 ± 0.74	10.1 ± 0.03	12.4 ± 1.3	16.4 ± 0.74	72.05 ± 5.9	144 ± 12	216.05

A = The first rearing group, autumn-winter. B = The second rearing group, spring-summer.
* First instar spiderlings were only fed on *Tetranychus urticae*.
Experiment ended with not less than 15 individuals of each sex.

Material and Methods

The individuals and egg sacs of *Anelosimus aulicus* (C.L. Koch, 1838) were collected from Agricultural Research Station at El-Qanater, El-Qalyubia Governorate. Collecting specimens began in August 2000 from sweet squash vegetable crop. The first rearing group (A) began on September 2000, autumn and winter, while the second group (B), spring and summer, began on April 2001, at room temperature (about 26°C and 60-70% R.H.).

Small glass containers (5 cm in diameter and 7 cm in height, covered at its top by muslin) were used for individual rearing. Some glass containers full of wet cotton were added between the rows of rearing glass containers to supply humidity.

Newly hatched spiderlings were reared individually; each one in its glass container. Adult female of the two-spotted mite *Tetranychus urticae* (Koch, 1836) was used as common diet for newly hatched spiderlings until the first moulting. Second spiderlings were then separated into 3 groups according to prey. The first group was fed on the adults of *T. urticae*, while the second was fed on adults of cowpea aphid, *Aphis craccivora* Koch, 1854 and the third on a mixture of both preys. Reared individuals were subjected to daily examination and surplus diet was supplied daily in summer and every three days in winter. Consumed prey individuals were counted and replaced by fresh ones.

Results and Discussion

I. Life history of *Anelosimus aulicus*

1. Incubation period: Average incubation period of eggs ranged between 12.8 (in group A) and 9.6 days (in group B) for both sexes.

El-Erksousy *et al*. (2002) reported that the incubation period averaged 12.0 days.

2. Number of instars: The life cycle of *A. aulicus* included five instars, spiderlings, in addition to adult. Both male and female had the same number of moultings to reach the adult stage. Differentiation between male and female was possible at the 4^{th} instar.

Avilés & Gelsey (1998) studied the life cycle of *Anelosimus jucundus* (O.P.-Cambridge, 1896), and noticed that both male and female passed through six moultings, seven instars, to reach the adult stage and that differentiation between sexes was possible at the 5^{th} instar.

3. Spiderlings: The spiderlings moulted five times until reaching maturity. The average duration of 1^{st}-5^{th} spiderlings, in days, was: Male: group A: 18.00, 27.60, 21.30, 28.60 & 65.30, when fed on mixed diet and 18.00, 39.99, 26.20, 41.00 & 61.16, when fed on aphids; group B: 12.40, 9.50, 10.00, 12.20 & 13.00, when fed on mixed diet and 12.40, 10.40, 10.80, 13.00 & 13.45, when fed on aphids. Female: group A: 20.75, 20.00, 27.60, 74.25 & 25.33, when fed on mixed diet and 26.50, 27.50, 29.00, 29.5 & 77.50, when fed on aphids; group B: 13.75, 9.80, 10.10, 12.4 & 16.40, when fed on mixed diet and 13.75, 12.50, 12.30, 13.80 & 17.72, when fed on aphids (Table 1).

El-Erksousy *et al*. (2002) reported that 1^{st}-5^{th} spiderlings of male averaged 6.5, 10.0, 8.0, 7.8 and 16.9 days respectively, while in case of female these stages averaged 7.5, 8.6, 5.2, 5.5 and 28.4 days respectively, when fed on cotton leaf worm *Spodoptera littoralis* (Boisduval, 1833).

4. Life cycle, adult longevity and life span: The life cycle duration, in days, averaged 173.60 for male and 180.73 for female, in group A and 66.70 & 72.05 in group B, when fed on mixed diet, while it lasted 197.80 & 202.80 days in group A and 70.43 & 78.60 days in group B for male and female respectively, when fed on

aphids. Thus, reaching maturity was faster with mixed diet than with feeding only on aphids. However, adult male and female lived for longer period when reared on mixed diet in group B as it averaged 73.10 & 144.00 days compared by 60.00 & 122.00 days when only fed on aphids. This result did not match with that in the other group (A), wherein adult longevity averaged shorter period (Table 1). Rearing on mixed diet, the life span was clearly prolonged in winter to reach 258.9, 340.73 days for male and female, respectively against 139.8 and 216.05 days in summer for both sexes, respectively (Table 1).

El-Erksousy *et al*. (2002) reported that life cycle of male and female *A. aulicus* was 61.2 and 67.2 days respectively at 26 ± 2°C and 60-70% R.H.

II. Food consumption

T. urticae was used alone to feed newly hatched spiderlings. The consumption increased with the increase of growth from 1st to 2nd and 3rd instars. But there was no more growth nor development beyond the 3rd instar, except 3 individuals in group A (Table 2). *T. urticae* alone was not a suitable diet for rearing *A. aulicus*.

Table 2: Food consumption of *Anelosimus aulicus* on *Tetranychus urticae*.

Stage	Total		Daily rate	
	Mean	S.D.	Mean	S.D.
1st instar	73.0	5.5	4.4	9.8
2nd instar	220.5	7.5	7.1	0.1
3rd instar	359.6	30.7	25.9	1.4
4th instar *	257.0	30.6	18.9	3.1

* Only 3 individuals.

As development progressed, spiderlings attacked more prey individuals. This clearly appeared when they were reared on mixed diet of *A. craccivora* and *T. urticae* (Table 3). Generally, the daily rate of food consumption of both male and female followed similar trend with higher values for female.

Table 3: Food consumption of *Anelosimus aulicus* on mixed diet.

Stage	Prey	Male				Female			
		Total		Daily rate		Total		Daily rate	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2nd instar	*A*	42.00	7.40	2.30	0.70	40.00	8.40	2.80	0.90
	T	48.00	5.10	2.70	0.80	50.00	1.30	3.70	0.50
3rd instar	*A*	50.60	7.50	2.40	0.10	55.00	3.40	3.60	1.10
	T	42.30	5.80	2.10	0.40	44.00	4.70	2.80	0.77
4th instar	*A*	80.00	10.40	4.00	1.20	102.00	12.10	6.10	2.10
	T	101.00	5.20	5.05	1.40	75.30	4.90	5.02	1.80
5th instar	*A*	61.00	4.60	4.06	1.00	228.00	7.80	11.40	1.90
	T	47.00	3.30	4.93	0.70	146.00	8.50	7.30	2.10
Adult	*A*	371.00	12.70	4.10	1.70	508.00	14.20	3.20	0.70
	T	172.00	2.40	2.02	0.30	186.00	2.60	1.20	0.25

* 1st instar was only fed on *T. urticae*. *A = Aphis craccivora*, *T = Tetranychus urticae*.

A considerable decrease in the daily rate of food consumption was noticed after reaching maturity, specially for females. It became even lower than the rate at 4th instar. Similar results were nearly obtained when feeding was only on aphids (Table 4).

Table 4: Food consumption of *Anelosimus aulicus* on *Aphis craccivora*.

Stage	Male				Female			
	Total		Daily rate		Total		Daily rate	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
2nd instar	56.50	3.40	4.70	2.10	88.50	4.70	4.50	0.50
3rd instar	88.00	5.60	5.25	0.73	73.25	2.10	5.20	0.31
4th instar	128.40	62.00	6.40	3.25	212.25	3.80	12.50	1.20
5th instar	176.00	5.40	10.35	4.70	280.00	7.20	14.00	2.30
Adult	405.00	8.10	4.50	1.60	766.00	1.04	5.10	1.30

* First instar was only fed on *T. urticae*.

III. Effect of food quality on spider's fecundity

Diet affected female whether its longevity or fecundity. Preoviposition and oviposition periods were slightly longer when the female was fed only on aphids than when feeding was on a mixture of aphids and mites, in both rearing groups A (autumn-winter) and B (spring-summer). On the contrary, post-oviposition period was slightly shorter when the female was fed only on aphids than when feeding was on the mixed diet, in both rearing groups A and B (Table 5).

Table 5: Effect of different diets on fecundity of *Anelosimus aulicus* female in rearing groups A and B, under laboratory conditions.

Diet	*Aphis craccivora*		Mixed diet	
Developmental period of female (days)	A	B	A	B
Pre-oviposition	60.7 ± 12.9	40.1 ± 9.4	49.3 ± 14.3	30.0 ± 7.3
Oviposition	121.0 ± 15.6	77.0 ± 4.7	107.0 ± 14.1	99.0 ± 10.1
Post-oviposition	9.7 ± 1.4	5.1 ± 1.2	12.0 ± 1.3	7.0 ± 2.1
Average egg sac / female	8.6 ± 0.1	8.9 ± 0.4	11.0 ± 0.9	14.0 ± 1.1
Total number of eggs / female during longevity	60.2 ± 1.8	71.2 ± 0.83	149.9 ± 2.9	224.0 ± 4.24
Daily rate (eggs/day)	0.49	0.92	1.50	2.09

A = Autumn-winter. B = Spring-summer.

Average number of egg sacs per female during its longevity ranged between 8.6 and 14 egg sacs. Both season and diet affected number of egg sacs and total number of eggs/female (Table 5). Irrespective of season, egg sacs and number of eggs production were influenced by diet. Average sacs ranged between 8.6 and 8.9/female with average number of eggs 60.2 and 71.2 in rearing groups A (autumn-winter) and B (spring-summer) when female was fed only on aphids. This was increased to 11 and 14 egg sacs and 149.9 and 224 eggs/female when fed on mixed diet of aphids and mites. The last figures elucidate that also season considerably affected egg sac production (Table 5). Generally, daily rate of deposited eggs was considerably higher when the female was fed on mixed diet 1.50 and 2.09 in comparison with 0.49 and 0.92 eggs/day when fed only on aphids.

IV. Mating Behaviour

An adult female was fed about 24 hours before introducing the male into the same glass container. The male moved towards female's web jerking his pedipalps until

reaching it. Then, he touched the tips of the female's legs and pedipalps. A preparatory period preceded copulation.

A. Preparatory period: The female cleaned her abdomen, legs and pedipalps with mouth fluid and stayed quietly. Simultaneously, the male did the same and jerked his body. Then, he cleaned the palpal organ by his legs and rubbed his pedipalps by each other and moved them between the chelicerae. The female moved around herself many times then stayed calmly while the male walked jerking his body, spinned a silk thread between him and the female and cut other threads connected to female off. Thereafter, the male vibrated that thread by his legs' claws. Then, the female pulled the thread by her first pair of legs as a respond to the male's signal.

When there was no signal from the male or there was something wrong during the preparatory period, the female refused the male, opening her chelicerae to enforce him to move away, and no copulation happened.

B. Copulation: The male held the female using his first pair of legs; leg I to hold her leg II, and leg II to hold her leg III. Then, the male inserted his right palp in female's vulva and this lasted 4-5 minutes motionless, then he pulled it out but the tip of the long embolus remained inside the female's vulva. The thin stretched embolus was pulled to get a spiral shape after coming out from the vulva. Then, the male cleaned the embolus and rolled it inside the pidipalp. The process of cleaning and rolling took about 5 minutes. The male cleaned the left palp while the female was still quiet. When the male finished cleaning, he vibrated the thread again with his leg claws, and then the female pulled the thread, connected to him, to admit more copulation. The male repeated copulation and inserted his left palp in the female's vulva. The male repeated this process, many times, by both palps alternatively. At the end, the female raised her chelicerae against the male to stop the process. If the male tried to copulate again, the female actually attacked him (once, a female killed her male and fed on his body).

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Ecological studies on spider families associated with some vegetable crops (Arachnida: Araneida) in Egypt

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Abstract

Spiders of 14 families were collected from ten vegetable crops at Gharbia governorate during two successive years by two methods of collecting (pitfall traps and picking up with the hands). Cabbage, eggplant and pepper crops contained the highest number of spider families (11-12) while the lowest number (5) was collected from potato crop. The total number of spiders was 2715 individuals for the two years. The most dominant family was Lycosidae followed by Linyphiidae and Philodromidae. Families Salticidae, Theridiidae, Dictynidae, and Araneidae appeared with relatively moderate numbers while the other families were found in few numbers. The increase in number of spider individuals was related to the seasons of the year. Picking up with the hands allowed to collect more families than by pitfall traps. The distribution of 8 species within the Nile Delta is noted.

Keywords: Spiders, Vegetable crops, Ecology, Pitfall traps, Gharbia, Egypt.

Introduction

Biological control involves the use of natural enemies to control pests. Since it is not possible to characterize a universally effective natural enemy for biological control (Huffaker *et al*, 1977) it is necessary to explore many possibilities in searching for natural enemies suited to certain pest problems or specific ecological situations. The spiders may be found almost every where, they are in fact seize only living animals (Kaston, 1978; Preston-Mafham & Preston-Mafham, 1984). Several spider families include species which feed on a wide variety of arthropod pests (Putman, 1967; Burgess, 1976; Morse, 1995; Mohafez, 2000; Sallam, 2002).

Table 1 : Occurrence of spider families on ten vegetable crops during two successive years (2000-2002).

Family	Squash		Beans		Sweat potato		Cabbage		Egg plant		Pepper		Pea		Potato		Onion		Garlic		Total	
	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H
1- Agelenidae C.L. Koch, 1837						+															0	1
2- Araneidae Simon, 1895		+				+		+		+	+	+		+		+		+			1	8
3- Dictynidae O.P.-Cambridge, 1871		+		+	+	+		+		+		+		+	+			+		+	2	9
4- Gnaphosidae Pocock, 1898	+	+	+	+		+	+		+	+		+					+			+	5	6
5- Linyphiidae Blackwall, 1859	+	+	+	+		+		+		+	+	+	+	+	+	+	+	+	+	+	7	10
6- Lycosidae Sundevall, 1833	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10	10
7- Miturgidae Simon, 1885				+		+	+			+		+		+							1	5
8- Philodromidae Thorell, 1870	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	10	10
9- Pisauridae Simon, 1890								+				+		+							0	3
10- Salticidae Blackwall, 1841		+		+		+		+	+	+		+	+	+					+	+	3	8
11- Tetragnathidae Menge, 1866								+	+			+									1	2
12- Theridiidae Sundevall, 1833	+	+	+	+	+	+	+	+	+	+				+			+	+		+	6	8
13- Thomisidae Sundevall, 1833										+	+	+									1	2
14- Uloboridae Thorell, 1869										+											0	1
Total of families	5	8	5	8	4	10	5	9	6	11	5	11	4	9	4	4	5	6	4	7		
	8		8		10		11		12		11		9		5		7		7			

T = pitfall traps, H = picking up with the hands.

El-Hennawy (2002) published a list of the Egyptian spider species, 385 species, belonging to 187 genera within 40 families, with their distribution localities. Vegetable crops provide a habitat for a variety of spider species, some of which may reduce pest populations. Several authors have pointed out that the insecticides used in various crops are detrimental to the spider populations. Therefore, this work studies the spiders collected from ten vegetable crops, and densities of different spider families during two successive years by two collecting methods for plant and ground spiders.

Material and Methods

Spiders were randomly collected from ten vegetable crops [1.Squash (Pumpkin), *Cucurbita pepo*, April-June; 2.Beans, *Phaseolus vulgaris*, April-June; 3.Sweet potato, *Ipomaea batatas*, June-September; 4.Cabbage, *Brassica oleracea* var. *capitata*, July-September; 5.Eggplant (Aubergine), *Solanum melongena*, July-October; 6.Pepper, *Capsicum annum*, July-October; 7.Pea, *Pisum sativum*, October-December; 8.Potato, *Solanum tuberosum*, November-December; 9.Onion, *Allium cepa*, December-April; 10.Garlic, *Allium sativum*, December-April], during two successive years, April 2000 – April 2002, using two methods for collecting: pitfall traps and picking up with the hands.

Plastic containers (7 cm diameter and 9 cm depth) were used for pitfall trapping after filling every trap with 5 ml of foamy soap solution. Traps were set at different sampling sites, 5 meters distant from each other, for 48 hours. Five traps were used for each crop and checked at 2 weeks intervals during the surveying period.

Spiders were also picked up with the hands and naked eyes, using sometimes a 7x lens for small individuals. The big individuals were kept in 1.5 x 6 cm tubes and small ones were collected by camel's hair brush and kept in 1 x 4 cm plastic tubes. Samples were collected biweekly for one hour (from 11 to 12 am). Individuals were preserved in 70% ethanol and transferred to laboratory for counting and identification.

Results and Discussion

The total number of spider individuals collected during the two years of this study reached 2715 (1386 by pitfall traps and 1329 by picking up with the hands). The identification of these individuals revealed that they belong to 14 families. Only one specimen of family Agelenidae was found during the first year. The same thing happened with family Uloboridae in the second year. The other families, *i.e.* Araneidae, Dictynidae, Gnaphosidae, Linyphiidae, Lycosidae, Miturgidae, Philodromidae, Pisauridae, Salticidae, Teragnathidae, Theridiidae, and Thomisidae, were encountered during both the first and second years (Table 1).

Lycosidae (1728 individuals) was the dominant family during the two years, collected by the two methods from all crops, followed by Linyphiidae (381) and Philodromidae (376). Families: Araneidae, Dictynidae, Salticidae, and Theridiidae appeared in moderate numbers (43-55 individuals), while the families Agelenidae, Gnaphosidae, Miturgidae, Pisauridae, Tetragnathidae, and Thomisidae (1-14) were collected in few numbers (Table 2). The ratios of the first three families were: Lycosidae 63.65%, Linyphiidae 14.03% and Philodromidae 13.85%. These families were also the most dominant families in the study of spiders in Menoufiya governorate by Ghabbour *et al* (1999) with the ratios 79.96, 9.23, and 6.41% respectively.

Table 2 : Spider taxa and numbers of individuals collected from ten vegetable plants during two successive years (2000–2002).

Taxa	Squash		Beans		Sweat potato		Cabbage		Egg plant		Pepper		Pea		Potato		Onion		Garlic		Total	
	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H	T	H
Agelenidae																						
Lycosoides sp.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Araneidae																						
Unidentified genera	0	1	0	0	0	4	0	8	0	7	1	13	0	3	0	2	0	3	0	0	1	41
Dictynidae																						
Unidentified genera	0	6	0	4	1	4	0	3	0	6	0	10	0	3	1	0	0	3	0	3	2	42
Gnaphosidae	1	1	2	1	0	1	2	0	1	1	0	1	0	0	0	0	2	0	0	1	8	6
Pterotricha sp.	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Synaphosus sp.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		
Trachyzelotes sp.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
Zelotes sp.	1	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0		
Unidentified genera	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0		
Linyphiidae	32	86	28	127	0	10	0	9	0	5	1	2	2	5	2	8	5	35	7	17	77	304
Erigone dentipalpis	13	31	11	43	0	2	0	0	0	1	0	1	1	0	0	0	0	5	0	5		
Gnathonarium dentatum	0	19	1	24	0	0	0	2	0	2	1	1	0	3	0	5	0	2	0	1		
Prinerigone vagans	9	5	12	6	0	1	0	2	0	0	0	0	1	0	0	2	3	9	4	3		
Unidentified genera	10	31	4	54	0	7	0	5	0	2	0	0	0	2	2	1	2	19	3	8		
Lycosidae	112	50	182	52	142	50	134	76	161	72	200	58	38	50	15	38	99	46	93	60	1176	552
Hogna ferox sp.	0	0	3	0	2	5	0	1	1	1	1	0	0	0	0	0	0	0	0	0		
Unidentified genera	112	50	179	52	140	45	134	75	160	71	199	58	38	50	15	38	99	46	93	60		

Miturgidae *Cheiracanthium* sp.	0	0	0	2	0	1	1	0	0	3	0	1	0	1	0	0	0	0	0	0	1	8
Philodromidae *Thanatus albini*	3	22	6	23	22	84	10	21	14	42	9	40	3	21	0	4	12	20	6	14	85	291
Pisauridae Unidentified genera	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	3
Salticidae Unidentified genera	0	9	0	5	0	7	0	7	2	7	0	6	2	3	0	0	0	0	2	5	6	49
Tetragnathidae Unidentified genera	0	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	1	0	2	3
Theridiidae	3	4	2	3	1	5	15	3	4	4	0	0	0	1	0	0	2	1	0	1	27	22
Euryopis sp.	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0		
Steatoda erigoniformis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0		
Theridion melanostictum	0	0	0	0	0	0	2	1	2	4	0	0	0	0	0	0	0	0	0	1		
Unidentified genera	3	1	2	3	1	5	13	2	2	0	0	0	0	1	0	0	0	1	0	0		
Thomisidae	0	0	0	0	0	0	0	0	0	2	1	4	0	0	0	0	0	0	0	0	1	6
Runcinia lateralis	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0		
Thomisus sp	0	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0		
Uloboridae *Uloborus* sp.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	151	179	220	217	166	167	162	129	183	150	212	137	45	89	18	52	120	108	109	101	1386	1329
Grand total	330		437		333		291		333		349		134		70		228		210		2715	

T = pitfall traps, H = picking up with the hands.

Due to host plants, the highest number of spider families (11) was recorded, using the two collecting methods, from cabbage, eggplant and pepper, followed by sweet potato (10 families), pea (9), then squash and beans (8), and 7 families from onion and garlic. The lowest number of spider families (5) was from potato crop.

The highest number of spiders per crop was 437 individuals from beans crop, followed by pepper, eggplant, sweet potato and squash (330-349 individuals). The spider numbers were moderate in cabbage, onion and garlic (210-291), while the lowest numbers of spider were collected from pea and potato (134 and 70 respectively).

Spiders of the 14 families were collected by picking up with the hands and all of them except Agelenidae, Pisauridae and Uloboridae were found in pitfall traps. Both Lycosidae and Philodromidae were collected from all studied crops by the two used methods while Linyphiidae was collected from the 10 crops by picking up with the hands and from only 7 crops by pitfall traps. Using pitfall traps enabled us to collect more spider individuals than by picking up with the hands method. While the second method enabled us to find more families than those found in pitfall traps. The rarely represented families were only found with the following crops: 1. Agelenidae in sweet potato. 2. Pisauridae in cabbage, pepper and pea. 3. Uloboridae in eggplant.

Finding most of the fourteen spider families with the majority of the ten vegetable crops as shown in tables (1 and 2), it is possible to state that there was no significant relationship among such families and vegetable crops.

The maximum number of spider individuals, during the two successive years, was found in beans crop (April-June): T 220 + H 217 and the minimum number was found in potato crop (November-December): T 18 + H 52 (Table 2). The number of spider individuals increased in spring-summer and decreased in autumn-winter period. This clearly appeared in the numbers of Lycosidae, the dominant family, which were 210, 233 and 258 (in cabbage, eggplant and pepper crops) on July-September and decreased to 88 and 53 (in pea and potato) on November-December.

A few of the collected specimens were identifiable to species (Table 2). They are:

Family Linyphiidae

Erigone dentipalpis (Wider, 1834)

Gnathonarium dentatum (Wider, 1834)

Prinerigone vegans (Savigny, 1825)

Family Lycosidae

Hogna ferox (Lucas, 1838)

Family Philodromidae

Thanatus albini (Audouin, 1825)

Family Theridiidae

Steatoda erigoniformis (O.P.-Cambridge, 1872)

Theridion melanostictum O.P.-Cambridge, 1876

Family Thomisidae

Runcinia lateralis (C.L. Koch, 1838)

These 8 species were already recorded from the Nile Delta (El-Hennawy, 2002) but their distribution within the Delta is not studied. Therefore, recording them from El-Gharbia governorate adds a definite locality.

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Studies on some biological aspects of *Erigone dentipalpis* (Wider, 1834) (Arachnida: Araneida: Linyphiidae)

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Abstract

The linyphiid spider *Erigone dentipalpis* was reared in laboratory at 28°C and 70-80% R.H., feeding on the two-spotted spider mite *Tetranychus urticae*. The mean of female pre-oviposition, oviposition and post-oviposition periods were 10.62, 9.15 and 6 days respectively. The female laid 2-3 egg sacs. The mean number of eggs/sac was 16.08 eggs. The incubation period of eggs was 13.8 days. The life cycle of this spider was 59.18 days for male and 69.02 for female. The female had five spiderling instars while the male had only four. The mean total rate consumption of *T. urticae* individuals was 376 and 480.2 for the total spiderling instars of male and female respectively. The female of *E. dentipalpis* consumed 754.4 individuals during her longevity with daily rate of 63.9 while male consumed 377.2 individuals with daily rate of 19.3 during his life. Notes on feeding behaviour, mating and moulting process are included.

Keywords: Life cycle, Fecundity, Feeding, Spiders, Linyphiidae, *Erigone dentipalpis*, Egypt.

Introduction

Family Linyphiidae includes 4214 species which belong to 559 genera (Platnick, 2003). This family is represented in Egypt by 8 species of 8 genera, one of them is *Erigone dentipalpis* (Wider, 1834) (El-Hennawy, 2002a & 2002b). Keer and Maelfait (1988) studied the population of *Erigone atra* Blackwall, 1833 and *E. dentipalpis* in Belgium with a variety of sampling techniques to find that no distinct differences between the life cycles of the two species were observed either in the field or in the laboratory. Alderweireldt (1994) studied the feeding ecology of number of linyphiid species in addition to the study of prey capture strategies. *E. dentipalpis* was among the

studied species and mites were among the prey items of pest species. He found that only 61.6% of the prey captured was consumed. Until now, there is no published detailed study on the biology of *Erigone dentipalpis*. Therefore, it was necessary to study its biology and feeding behaviour. It may be useful as biological control agent.

Material and Methods

Some females, of *Erigone dentipalpis* (Wider, 1834) with their egg sacs, were collected from vegetable crops using camel's hair brush. Each female was placed in a glass container (5 cm diameter x 9 cm depth) and covered with a piece of muslin cloth held by rubber band. The glass container allowed good observation of the spider. Mite individuals of *Tetranychus urticae* (Koch, 1836) were daily added as food supply. The newly hatched spiderlings were transferred to separate tubes (1.5 x 16 cm) to complete their development and supplied daily with food. Highly infested with two-spotted spider mites castor oil plant leaves were collected to infest potted beans *Phaseolus vulgaris* to be a continuous source for feeding spiders at laboratory. The containers and tubes were kept in an incubator at 28±1°C and 60-70% R.H. Some biological aspects and the consumption rate of prey were studied under these conditions.

Results and Discussion

Feeding behaviour

When the spider found a living individual of *T. urticae*, it came close to it and suddenly caught the prey from the anterior part of the body between its chelicerae, imbedding its fangs in the body of the prey and then began to liquefy and to suck its body contents. Feeding on the prey took about 4 minutes. After that, the spider's abdomen became inflated and the attacking spider usually rested for few minutes before attacking another prey. It was noticed that the spider usually killed more prey individuals than those which it fed on.

Moulting

A resting period lasted for one to two hours before moulting. During this period the spider retreated and ceased feeding. The moulting process began by splitting the old integument along the two lateral sides of the body. Then the spider got rid of its old cuticle through twisting movements. This was followed by withdrawal of its mouth parts and legs outside the old cuticle crawling to disengage itself from the exuvium. The moulting process lasted for 12 hours. The spider stopped moving for a few minutes after moulting until becoming dry, then it began to move and feed.

Mating behaviour

When a male was introduced into a glass tube containing a female after her final moulting, the female stayed without movement for a few minutes and also the male. Courtship began by slow movement of the male around the glass tube towards the female. The male made a web on the tube's wall moving his forelegs forwardly. Then, he began to move his palps. Courtship took a few minutes. The female came nearer to the male. When he faced the epigynum of the female, he inserted his right palpal organ in her genital opening. Copulation period lasted about 12-17 minutes. The male cleaned his right palpal organ and moved away from the female. After staying without movement for 8-9 minutes, he began to repeat copulation using his left palp. At last, the male tried to go away but the female attacked him as a prey.

Oviposition

After mating, the female needed 10-11 days before depositing eggs (pre-oviposition period). Then the female stopped feeding and began to construct a semi-spherical silky egg sac by her spinnerets. All eggs were deposited at the same day, then the female covered the egg sac with another layer of dense silky web. The egg sac had a curved oval shape. The female constructed 2-3 egg sacs during her oviposition period which lasted from 7 to 14 days. Each egg sac contained 9-21 eggs. The period between every two sacs ranged 5-7 days. The post-oviposition period ranged from 4 to 10 days (Table 1).

Table 1: Fecundity of *Erigone dentipalpis* female, feeding on *Tetranychus urticae*.

Developmental period of female (days)	Range	Mean	S.D.
Pre-oviposition	10-11	10.62	0.1
Oviposition	7-14	9.15	0.9
Post-oviposition	4-10	6	0.6
Number of eggs / egg sac	9-21	16.08	1.4
Number of egg sacs / female	2-3	2.3	0.1

Incubation period

Incubation period of eggs ranged from 13 to 15 days at 28±1ºC and 60-70% R.H. (Table 2). Hatched spiderlings crawled outside the transparent egg shells and remnants of the cuticle were observed inside the egg shells.

Table 2: Duration of different stages of *Erigone dentipalpis*, feeding on *T. urticae*.

Developmental Stage	Duration of different stages (days)					
	Male			Female		
	Range	Mean	S.D.	Range	Mean	S.D.
Incubation period	13-15	13.8	0	13-15	13.8	0
1st spiderling instar	12-13	12.63	0.2	12-13	12.46	0.2
2nd spiderling instar	11	11	0	10-12	11.15	0.2
3rd spiderling instar	10-13	11.5	0.47	9-13	11.23	0.3
4th spiderling instar	9-11	10.25	0.31	9-11	10.46	0.2
5th spiderling instar	--	--	--	9-11	9.92	0.2
Total spiderling instars	42-48	45.38	0.9	49-60	55.22	1.1
Life cycle	55-63	59.18	1.4	62-75	69.02	1.2
Adult Longevity	9-33	24	3.0	29-34	31.6	0.6
Life span	64-96	83.18	4.9	91-109	100.62	1.4

Spiderlings development

The female passed through five spiderling stages, while male passed through only four stages (Table 2). Foelix (1996) said that “Small spiders need only a few molts (about 5), … The small males achieve maturity with 1-2 fewer molts than the (larger) females.” The first spiderling instar was the longest period which lasted for 12.63 and 12.46 days for male and female respectively. After moulting, the second spiderling instar was 11 and 11.15 days, while the third spiderling lasted for 11.50 and 11.23 days for males and females respectively. The fourth spiderling instar was the shortest period

for male which lasted for 10.25 days, while it was 10.46 days for female. The fifth spiderling instar for female was the shortest period which lasted for 9.92 days.

The mean of life cycle of *E. dentipalpis* lasted 69.02 and 59.18 days for female and male, respectively. This short life cycle means that several generations are expected during the whole year.

Sex ratio. During one generation of *E. dentipalpis*, the male : female ratio was 1 : 1.6.

Adult longevity

Adult longevity of female was longer than male, it ranged 29-34 days, while it ranged 9-33 days for male. Life span also differed according to sex. The female life span ranged 91-109 days for female and 63-96 days for male.

Table 3: Food consumption of *Erigone dentipalpis*. Number of consumed individuals of different stages of *Tetranychus urticae*.

Developmental Stage	Daily rate			Total		
	Range	Mean	S.D.	Range	Mean	S.D.
Male						
1st instar	3-9	5.2	8.5	38-51	46	1.7
2nd instar	7-13	8.8	5.8	84-90	87.9	0.7
3rd instar	10-15	11.8	7.1	99-135	94.3	4.8
4th instar	9-22	14.5	6.3	106-149	129.8	5.5
Total instars	29-59	47.2	5.9	327-425	376	6.1
Adult Longevity	2-23	19.3	8.2	151-514	377.2	47.8
Female						
1st instar	2-6	3.6	5.1	30-38	32.6	0.7
2nd instar	6-12	7.7	6.4	70-90	77	1.6
3rd instar	9-16	11.35	9.4	99-127	114.2	2.4
4th instar	10-20	13.15	22.6	109-146	131.9	2.9
5th instar	7-23	14.2	22.1	99-153	123.5	4.5
Total instars	34-77	50	9.2	407-554	480.2	5.4
Pre-oviposition	17-30	26.9	13.3	137-244	219.5	7.9
Oviposition	15-27	23.4	21.3	209-570	510.7	26.5
Post-oviposition	1-26	13.6	17.1	4-64	24.2	8.2
Adult Longevity	33-83	63.9	21.9	350-878	754.4	24.1

Food consumption

The results of predation capacity are represented in Table (3). The daily rate of consumption increased gradually according to the age of spiderlings, and the adult was the most efficient stage. The mean daily rate was 5.2 and 3.6 prey individuals for the 1st

spiderling instar per male and female, and reached its maximum daily rate at the last instar, 14.5 individuals per male 4th instar and 14.2 individuals per female 5th instar. The mean total rate of consumption was 376 and 480.2 individuals for the total spiderlings of male and female respectively. The mean daily rate of adult female consumption was 26.9, 23.4 and 13.6 for preoviposition, oviposition and postoviposition stages respectively. The mean total rate of consumption during female longevity was 754.4 individuals, while the male consumed 377.2 individuals during his life longevity.

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Biological aspects of *Nurscia albomaculata* (Lucas, 1846) (Arachnida: Araneida: Titanoecidae) in Egypt

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Abstract

Nurscia albomaculata (Lucas, 1846), family Titanoecidae, was collected from greenhouses in Dokki, Giza. Its life cycle was studied in laboratory. It had 5-6 spiderling instars before adulthood for both males and females. Different instars were reared on different stages of larvae of cotton leaf worm. Food consumption was also noticed, in addition to some biological and ethological aspects.

Keywords: Life cycle, Feeding, Spiders, Titanoecidae, *Nurscia albomaculata*, Egypt.

Introduction

Family Titanoecidae Lehtinen, 1967 includes 5 genera and 44 species all over the world (Platnick, 2003). In Egypt, two species of two genera of this family were recorded: *Nurscia albomaculata* (Lucas, 1846) and *Titanoeca tristis* L. Koch, 1872 (El-Hennawy, 1990, 2002a & 2002b). *N. albomaculata* is one of four species of genus *Nurscia* Simon, 1874, recorded from Portugal to Japan (Platnick, 2003).

N. albomaculata was recorded from Alexandria in northern Egypt (El-Hennawy, 2002a). It was found in different parts of Nile Delta (HE). It was also encountered in greenhouses of some vegetable plants (cucumber, pepper and tomato) and in cultivated fields in several governorates. *N. albomaculata* was found to be the dominant ground species in greenhouses. There is no studies on it. Therefore, it is necessary to study its life cycle and to try to know its role in the agroecosystem, specially in greenhouses.

Material and Methods

Alive spiders of *Nurscia albomaculata* (Lucas, 1846) were individually picked up with the hands from plastic greenhouses of pepper (*Capsicum annum*) which belong to Central Greenhouses of the Ministry of Agriculture, Dokki, Giza. Those individuals were found inside their silk tunnels among plants near the connections of the roots with the stems, immediately on soil surface, and under clusters of clay which cover the roots of the plants. The collected specimens were found in different age stages in addition to adults. Some egg sacs were found attached to the silk tunnels of the adult females and were also collected. The egg sacs were kept in plastic vials in the laboratory until eggs' hatching.

All collected specimens and hatched spiderlings, inside laboratory, were individually reared by the first author (GS) and fed, every two days, on different stages of larvae of cotton leaf worm, *Spodoptera littoralis* (Boisduval, 1833), under laboratory conditions, 26-28^{o}C and 60-70% R.H. The spider species was identified by the second author (HE).

Results and Discussion

Egg sacs, Eggs and Incubation period

Egg sacs were circular in shape and white in colour. They were usually covered by soil particles. This may be a kind of camouflage for protection. The egg sacs which were constructed in laboratory were rosy white in colour.

Ten egg sacs were collected from greenhouses (7 May - 26 June 2002). The range of number of eggs was 19–30. Average number of eggs per egg sac was 24.3 ± 4.35 eggs.

Three females, collected on 26th June 2002, laid eggs in captivity; 1. 29/6, 18 eggs, which hatched on 13th July, 2. 1/7, 20 eggs, 3. 6/7, 21 eggs, 4. 17/7, 25 eggs. The last two egg sacs were of the same mother. The eggs of those four egg sacs, except the first one, did not hatch. Average number of eggs laid in laboratory per egg sac, 21 ± 2.94 eggs, was slightly fewer than those laid in greenhouses. A laboratory reared female laid egg mass on 14th December, at the age of 91 days, without mating and eggs did not hatch.

Incubation period of eggs of *N. albomaculata* lasted for 14 days under laboratory conditions. Only one case was observed.

Spiderlings

Few egg sacs were collected from greenhouses and their eggs hatched in the laboratory between 19th May and 6th July. Hatched spiderlings of two of them were successfully reared. Most of the hatched individuals of other sacs died in early stages. After hatching, the spiderlings were very active and able to capture their prey. They passed through five or six instars to either male or female during their development.

The duration of instar was longer during the instars 1-3 of female than those of the male while it was shorter during the instars 4-6. Generally, males needed longer durations than females before reaching maturity. The duration of different stages of *N. albomaculata* in laboratory was recorded in Table (1).

During rearing 20 individual spiderlings of one egg sac of *N. abomaculata*, 4 individuals died before reaching maturity, i.e. Mortality before maturity = 20%; 1 died at 2nd instar, 1 died at 3rd instar, and 2 died at 6th instar. Those individuals were excluded from the calculation of instars' duration. The remaining 16 individuals reached maturity; 8 males (50%) and 8 females (50%). Sex ratio = 1 : 1 or ♂/♀ = 1.00. Half the males reached maturity after five moults and the other half after six moults (1 : 1) while 37.5% of the females reached maturity after five moults and 62.5% after six moults. The mean life cycle duration was nearly the same for male and female (about 108-109 days).

Once, an adult female moulted twice after being adult. It is known that "For most spider the last molt marks the transition to sexual maturity; only in some exceptional cases do adult spiders still molt further" (Foelix, 1996). Kraus & Kraus (1988) stated that adult males and females of the cribellate eresid genus *Stegodyphus* may pass a "post-adult moulting". This single case of the cribellate titanoecid *Nurscia* is another "post-adult moulting" case.

Table 1: Duration of different stages of *Nurscia albomaculata* (Lucas, 1846).

Developmental stage	Duration (days)					
	Male			Female		
	Range	Mean	S.D.	Range	Mean	S.D.
1st instar	11-35	17.69	6.142	16-37	22.33	7.215
2nd instar	7-35	18.85	7.116	7-35	20.08	7.960
3rd instar	12-23	17.69	3.794	7-23	16.08	5.107
4th instar	9-44	20.38	9.794	9-24	16	4.862
5th instar	11-47	19.92	10.882	9-41	21.64	10.240
6th instar	11-47	27.57	14.616	10-51	24.14	14.416
Life cycle	81-149	109.38	26.937	70-149	108.42	23.333
Adult longevity	24-140	69.67	45.820	120-189	144.42	22.956
Life span	105-266	181.89	65.910	153-287	244.5	35.184

Adult longevity and Life span

Adult females lived longer than males; nearly twice (about 144 against 70 days). Life span of females was also longer than that of males (about 244 against 182 days). Males died between October and March while females died between December and April.

Food consumption

During the study of food consumption of *N. albomaculata*, different spiderling instars and adults were fed on various instars of *S. littoralis* larvae. Both first and second instars of spiderlins were fed on the first instar of *S. littoralis*. Third instar spiderlings were fed on the second instar of prey and fourth instar spiderlings were fed on its third instar. The fifth and sixth instars of spiderlings as well as adults were fed on the fourth instar of the prey. The average number of consumed prey and the daily rate of consumption increased during last instars, i.e. 4th-6th, more than during early instars, 1st-3rd.

Table 2: Food consumption of different stages of *Nurscia abomaculata* (Lucas, 1846).

Developmental stage	Prey* instar	Male				Female			
		Total			Daily rate	Total			Daily rate
		Range	Mean	S.D.		Range	Mean	S.D.	
1st instar	1st	15.5-33	23.69	6.28	1.34	17.5-40	26.83	8.44	1.20
2nd instar		11.5-38.2	18.48	7.88	0.98	15-37.5	23.12	7.0	1.15
3rd instar	2nd	15-35	23.50	6.76	1.33	7.5-97.5	30.42	23.71	1.89
4th instar	3rd	20-90	38.65	20.33	1.90	20-70	31.87	14.31	1.99
5th instar	4th	20-80	40	18.37	2.01	15-85	40.04	19.63	1.85
6th instar		20-80	49.17	24.78	1.78	25-80	46.57	20.47	1.93
Adult		20-100	51.25	25.77	0.74	15-165	87.29	42.12	0.60

* Different stages of larvae of cotton leaf worm, *Spodoptera littoralis* (Boisduval, 1833).

Biological and Ethological Notes

1- Some trials were carried out to observe the mating behaviour between a laboratory reared female and a field captured male. No mating was observed but three females laid eggs.

2- Seven couples of male and female were observed to find that in five cases the female devoured the male. In the other two cases the male devoured the female.

3- No cannibalism was observed in the immature stages.

4- When the temperature of the incubator was accidentally decreased to –7°C for about 24 hours, the individuals became dormant. After returning to laboratory conditions, they restored their activity. This suggest that they may tolerate a wide range of temperature in nature.

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Arachnids in three Egyptian coastal protected areas on Aqaba gulf (Red Sea)

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Abstract

This is a preliminary study of four orders of class Arachnida, i.e. Araneida, Pseudoscorpionida. Scorpionida and Solpugida, in three Egyptian protected areas on the Gulf of Aqaba in South Sinai, i.e. Ras Mohammad, Nabq and Abu Galoum Protectorates. Several taxa were identified, including 25 spiders, 1 pseudoscorpion, 3 scorpions and 1 sun-spider, and many were unidentifiable. The spiders of Mangrove plants of these areas are here recorded for the first time. The studied areas need a seasonal survey and more detailed studies.

Key Words: Arachnida, Spiders, Scorpions, Pseudoscorpions, Solpugids, Protected areas, Mangrove, Aqaba Gulf, Red Sea, Sinai, Egypt.

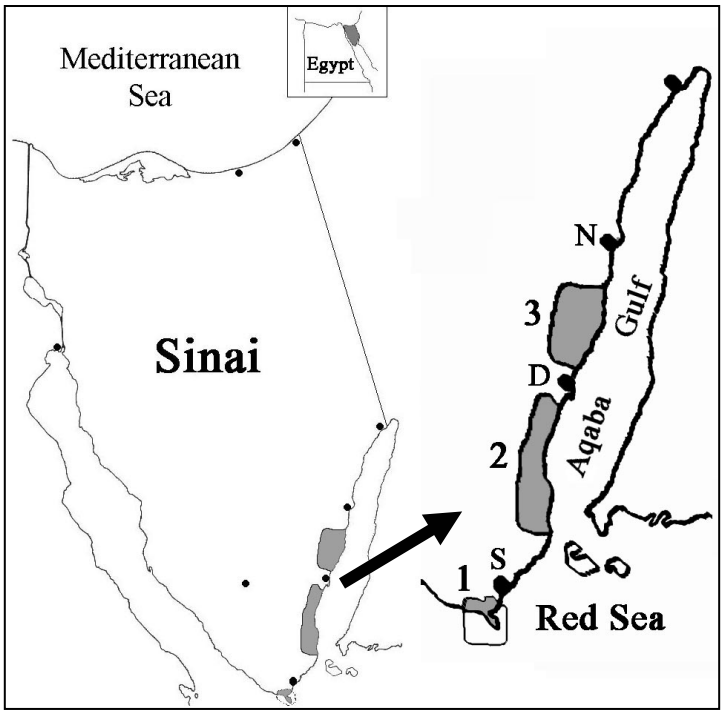
Introduction

Most studies in protected areas in the world are devoted to vertebrate animals. Invertebrate animals are mostly neglected, in spite of their huge number of species/individuals and their great influences on the surrounding habitats. Arachnids, especially spiders, constitute a considerable ratio of invertebrates with great ecological importance. They have a very important role, as predators, in biological balance.

A preliminary study of Arachnida in three protected areas on Aqaba Gulf had been achieved during 1994-1995. It is impossible to find each species living in an area during four limited trips. The recorded species may be the most common species in those areas.

Identification of spiders is very difficult in a poorly studied arachno-fauna as in Egypt. Juvenile specimens are useless and unidentifiable, even to genus level. In few cases, individual juvenile spiders were kept alive until they reached maturity and became identifiable (e.g. *Heriaeus buffoni* female and *Latrodectus pallidus* male).

The brief description of each of the three protectorates is adopted from MSEA (2001) and Rashid (2002).



Map 1. Ras Mohammad, Nabq and Abu Galoum Protectorates on map of Sinai.
1. Ras Mohammad protectorate
2. Nabq protectorate
3. Abu Galoum protectorate
S = Sharm El-Sheikh
D = Dahab
N = Nuweiba

Methods

A survey of spiders and scorpions had been achieved in three protected areas on Aqaba Gulf (Ras Mohammad, Nabq and Abu Galoum Protectorates) during 1994-1995. (Map 1).

Different sites were selected and surveyed as scattered places in each protectorate. The aim was to discover different areas and habitats and to know what species are existing there. Those sites are mentioned with their longitudes and latitudes in the Results section before the tables of collected spider specimens.

The collecting methods were: 1. Collecting with the hands, 2. Beating net, 3. Sweeping net, 4. Pitfall trapping, 5. Light attracting and 6. Ultra-Violet light collecting for scorpions. The identification of specimens was executed in the light of the available taxonomical knowledge, taking in consideration that the group of Arachnida is poorly studied in this geographical area. Indeed, it is the first study of arachnids in the coastal protected areas of Egypt.

Results

Results are here arranged within smaller sections, each deals with the spiders, scorpions, pseudoscorpions and sun-spiders of one protected area. A list of spider

species, alphabetically arranged, is presented at the end of these smaller sections with authors and dates to avoid mentioning them inside the tables.

A. Ras Mohammad protectorate

Ras Mohammad National Park was declared as protected area by the Prime Ministerial Decree No. 1068 for 1983 adjusted by Prime Ministerial Decree No. 2035 for 1996. Its area is about 480 km^2 (about 850 km^2 with Tiran and Sanafir islands). Type: World Heritage Protected Area.

Ras Mohammad is the headland at the southern most tip of the Sinai Peninsula, overlooking the juncture of the Gulfs of Suez and Aqaba. Coral reefs fringe Ras Mohammad from all directions; these include some of the best diving localities in the world. The uniqueness of the site, its diversity of vertebrate and invertebrates species, its coral formations and water clarity all combine to provide a memorable underwater experience. Littoral habitats include a Mangrove *Avicennia marina* community, salt marshes, intertidal flats, as well as, a diversity of shoreline configurations. The Mangrove Channel separates Ras Mohammad Peninsula from El-Baayra Islet at a length of approximately 250m. Beside the park's marine riches, it also contains a considerable diversity of desert habitats such as mountains and wadis, gravel plains and sand dunes. The threatened Dorcas Gazelle *Gazella dorcas* and Nubian Ibex *Capra nubiana* are both known from the park. Ras Mohammad is a bottleneck for migratory soaring birds, which pass through the area in vast numbers and regularly stop to rest and feed. The majority of the world population of White Stork *Ciconia ciconia* pass through the area. The threatened Green Turtle *Chelonia mydas* and Hawksbill Turtle *Eretmochelys imbricata* occur off Ras Mohammad regularly. The islands of Tiran and Sanafir are part of the Ras Mohammad Protected Area. These islands hold important breeding populations of the threatened and endemic White-eyed Gull *Larus leucophthalmus* and Osprey *Pandion haliaetus.* Adjoining sea grass beds are of importance for marine turtles.

Collecting Sites:
1. Mangrove Channel: 27º43'N 34º15'E
2. Water tank region, upon Wadi Khoshbi: 27º48'N 34º13'E
3. Wadi Khoshbi: 27º48'N 34º12'E
4. Wadi El-Kharitah: 27º51'N 34º15'E
5. Laboratories area and Visitors centre
6. Main Beach: 27º43'N 34º14'E

Dates of collecting: 2-3 April, 20-21 July, 20-21 November 1994 & 20-21 May 1995.

I. Order **Araneida**

Spiders of ten families were collected from five sites (1-5). The identification of the collected specimens with their numbers, months of collecting and sites of collection are included in Table 1 and the percentage of specimens of every spider family is plotted in Fig. 1.

Table 1: Spiders collected from Ras Mohammad protectorate (April 1994–May 1995).

Family	Species	Specimens	Sites	Months
Araneidae	? sp.	3j	1	Nov
Gnaphosidae	*Micaria* sp.	1♀	2	Apr
	Pterotricha conspersa	5♀, 1s♀, 8j	1,2,3,5	Apr, Jul, Nov
	? sp. (3 spp.)	1♂, 2♀, 3j	2,3	Apr, May, Jul, Nov
Miturgidae	*Cheiracanthium* sp.	1♀, 3j	2,4	Apr, May
Oecobiidae	*Oecobius* sp.	1j	2	Apr
	Uroctea limbata	1♀, 1j	3	Jul
Oxyopidae	*Peucetia arabica*	2♂, 3♀, 1s♂, 4s♀, 11j	1,2,4	Apr, May, Nov
Philodromidae	*Philodromus sinaiticus*	1♀	1	Apr
	Philodromus sp.	4♀, 29j	1,2,3,4	Apr, May, Jul, Nov
	Thanatus sp.	1♀	2	Apr
Pholcidae	? sp.	1♂, 2♀, 1s♂, 2 j	3,4	May, Jul
Salticidae	*Mogrus sinaicus*	1♂, 14♀, 1s♀, 8j	2,3,4	Apr, May, Jul
	? sp. (~5 spp.)	3♀, 1s♂, 2s♀, 41j	1,2,4,5	Apr, May, Nov
Thomisidae	*Heriaeus buffoni*	2s♀, 2j	2	Apr, May, Nov
	Thomisus onustus	35♂, 3♀, 10s♂, 25s♀, 87j	2,3,4	Apr, May, Jul
	Xysticus ferus ?	7♀, 6j	2,4	Apr, May, Nov
Zodariidae	*Zodarion* sp.	1s♀	3	Apr

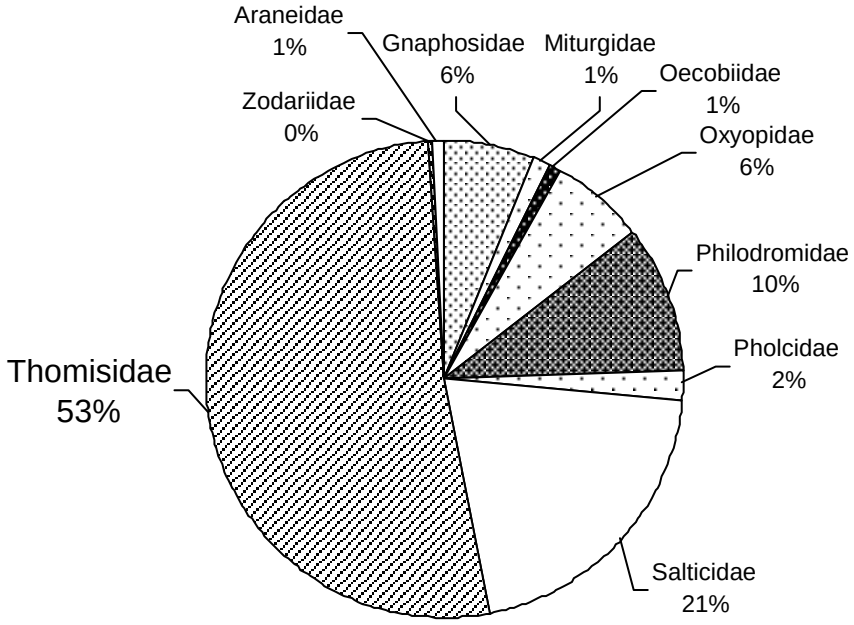


Fig. 1. Percentage of specimens of every spider family collected from Ras Mohammad Protectorate.

Most spiders were found under stones. The other habitats and observations on some spider taxa, arranged alphabetically according to families, are as follows :
ARANEIDAE: on Mangrove plants *Avicennia marina* (Forskål, 1775) in Site 1.
GNAPHOSIDAE: *Micaria*: under stones near ant colonies, Site 2. *Pterotricha conspersa*: females and juveniles were found among mangrove's litter in Site 1. A female of unidentifiable genus was found inside an empty nest of the salticid *Mogrus* on *Leptadenia pyrotechnica* (Forskål, 1775) plant in Site 3.
MITURGIDAE: *Cheiracanthium*: a female in its web with an egg sac, under stone ?!, in Site 2, on April.
OECOBIIDAE: *Uroctea limbata*: on a stony wall, Site 3.
OXYOPIDAE: *Peucetia arabica*: on plants in Sites 1,2,4.
PHILODROMIDAE: *Philodromus sinaiticus* ?: among mangrove's litter in Site 1. *Thanatus* sp.: a female with her egg sac, under stone in Site 2, on April.
PHOLCIDAE: in webs on a rocky wall in Site 3.
SALTICIDAE: among mangrove's litter in Site 1. *Mogrus sinaicus* ?: females inside their nests on *Acacia*, *Leptadenia* and other plants, and a wanderer male, Sites 2,3,4.
THOMISIDAE: *Heriaeus buffoni*: subadult females and juveniles were found under plants and stones in Site 2. One of the subadult females was reared until reaching adulthood and being identifiable to species. *Thomisus onustus*: several males, females and juveniles were found on plants and collected by sweeping net from the summits of herbs in Sites 2,3,4. Sometimes, it was found on taller plants like *Acacia* and *Aerva javanica*. *Xysticus ferus* ?: was found under plants and stones in Sites 2,4.
ZODARIIDAE: *Zodarion* sp.: 1 s♀ was found under a stone in Site 3, on April.

II. Order **Pseudoscorpionida**

Fifteen specimens, 7♂ + 7♀ + 1j, of Family Olpiidae, *Minniza* cf. *hirsti* J.C. Chamberlin, 1930, were found under stones; 14 in Site 2 (Water tank region, upon Wadi Khoshbi): 13 on April and 1 on July. Only one female specimen was found in Site 4 (Wadi El-Kharitah) on May.

III. Order **Scorpionida**

Scorpions were only found in Site 2. Three specimens of Family Buthidae, *Leiurus quinquestriatus* (Ehrenberg, 1828), were collected; two of them under stones on May and July and the third was collected on November using Ultra Violet radiation.

IV. Order **Solpugida**

Two families were recorded from two sites. In Site 2, one specimen of family Daesiidae, genus *Blossiola* ? was found under stone on April. A *Galeodes* ? individual (Family Galeodidae) was seen, but not caught, on July in the same site. In Site 6 (Main Beach), another *Galeodes* sp. was captured when it was running on sand at midday on May.

B. Nabq protectorate

Nabq was declared as protected area by the Prime Ministerial Decree No. 1511 for 1992. Its area is about 600 km^2. Type: Multipurpose Protected Area.

Nabq is one of the northern-most Mangrove *Avicennia marina* communities in the world. In Egypt the mangrove is surviving at the very edge of its ecological requirements. Mangrove or "Shoora" plant grows on the shore, but often invading the sea on muddy flats of shallow water. The complex web of life, which is built around the mangrove tree, is unique and highly susceptible to environmental changes. Besides plethora of marine organisms which are associated with mangroves, several water birds depend on the plant for nesting and feeding microhabitats. Striated Heron *Ardeola striata,* Reef Heron *Egretta gularis.* Spoonbill *Platalea leucorodia* and Osprey *Pandion haliaetus* all have substantial breeding populations in and around the mangrove. A small number of *Gazella dorcas* inhabits the adjacent desert which is rich in vegetation and supports a rich flora. The protected area includes a variety of landscape features and supports a small native population.

Collecting Sites:
1. Ghargana: 28º06'N 34º26'E (Region of Mangrove *Avicennia marina* (Forskål, 1775), and other plants)
2. Zeidiya: 28º08'N 34º26'E
3. Mouth of Wadi Kid – Kherieza: 28º10'N 34º22'E
4. Wadi Kid – Kherieza: 28º10'N 34º21'E
5. North of Wadi Umm-Arak: 28º08'N 34º26'E
6. Mangrove El-Rwaysiya (Al-Shura Al-Munqatiaah): 28º11'N 34º26'E

Dates of collecting: 30,31 March, 1,3 April, 14,15, 18,19 July, 18-20 November 1994 & 17-20 May 1995.

I. Order **Araneida**

Spiders of eighteen families were collected from the six studied sites. The identification of the collected specimens with their numbers, months of collecting and sites of collection are in Table 2 and the percentage of specimens of every spider family is plotted in Fig. 2.

Table 2: Spiders collected from Nabq protectorate (March 1994–May 1995).

Family	Species	Specimens	Sites	Month
Agelenidae	*Benoitia* sp.	2s♂, 2j	4	May, Jul
Araneidae	*Argiope lobata*	1♀	4	Jul
	Cyrtophora citricola	2♂, 8♀, 1s♀, 3j	2,4,5,6	Mar, May, Jul, Nov
	? sp.	7♀, 2j	6	Jul
Dictynidae	? sp.	1♂, 6♀, 4j	1,3,4,5	Mar-May, Jul, Nov
Eresidae	*Stegodyphus lineatus*	2♀, 11j	4	May, Jul, Nov
Filistatidae	? sp.	1j	4	Nov
Gnaphosidae	*Micaria ignea* ?	1♂, 4♀, 5j	3,4	Mar-May
	Pterotricha dalmasi	4♂, 1♀, 1s♀, 14j	2,3,4,5	Mar-May, Jul, Nov
	Zelotes sp.	1j	4	May

	? sp. (2 spp.)	1♂, 1s♂, 9j	3,4,5	Apr, May, Jul, Nov
Lycosidae	? sp.	1♀	4	Nov
Miturgidae	*Cheiracanthium* sp.	1s♂	5	Jul
Oecobiidae	*Uroctea limbata* ?	2♀, 3s♀	3	Mar, Apr
Oxyopidae	*Oxyopes* sp. *Peucetia arabica*	1j 5♂, 8♀, 19j	4 3,4	May Mar-May, Jul, Nov
Philodromidae	*Philodromus* sp. *Thanatus* sp.	3♂, 6♀, 1s♂, 1s♀, 51 j 2♀	2,4,5 3	Mar, May, Jul, Nov Apr
Pholcidae	*Holocnemus pluchei* ? sp.	1♀ 1j	3 4	Apr Nov
Salticidae	*Mogrus fulvovittatus* *Myrmarachne tristis* *Thyene imperialis* ? sp. (~4 spp.)	3♂, 1♀, 1s♂, 1s♀, 4j 2♂, 1♀, 1s♀, 5j 1♂ 3♀, 1s♀, 21j	3,4,5 2,4,5 2 3,4,5	Apr, May, Jul May, Jul, Nov Mar Apr, May, Jul, Nov
Scytodidae	*Scytodes* sp.	1♂	4	Nov
Sparassidae	*Eusparassus* sp.	3j	3,4	Mar, Nov
Tetragnathidae	*Tetragnatha* sp.	1s♀	6	Jul
Theridiidae	*Latrodectus pallidus*	1♂	4	Nov
	L. tredecimguttatus *Paidiscura dromedaria* ? sp. (2 spp.)	1♀ 4♂, 9♀, 2s♂, 61j 1♂, 5♀, 1s♂, 1s♀, 3j	4 2,4,5 3,5	May Mar, May, Nov Apr, Jul, Nov
Thomisidae	*Synema diana* *Thomisus onustus* *Xysticus ferus* ?	5♂, 1s♀, 27j 4♂, 5♀, 1s♀, 7j 1♀	1,4,5 2,3,4,5 4	Mar, May, Jul, Nov Mar-May, Jul Nov

Most spiders were found under stones. The other habitats and observations on some spider taxa, arranged alphabetically according to families, are as follows :

AGELENIDAE: *Benoitia* sp. juveniles were found in nests attached to their peculiar funnel webs among plants in Site 4.

ARANEIDAE: *Argiope lobata*: 1♀ on her orb web, Site 4, on July. *Cyrtophora citricola*: adults and juveniles were found on their webs in Sites 2,4,5,6; some of them on *Nitraria* trees and terrestrial parts of *Avicennia marina* (Mangrove plants).

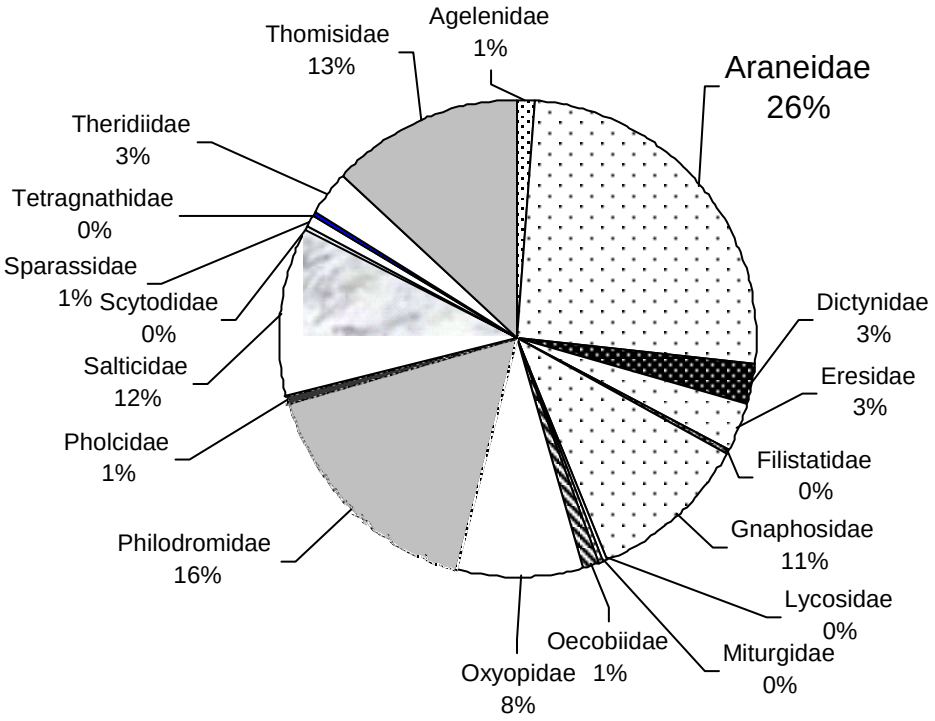
DICTYNIDAE: 1♀ on Mangrove plant, Site 1. Others in their webs on plants and under stones in Sites 3,4,5.

ERESIDAE: *Stegodyphus lineatus*: females and juveniles were found inside their nests on plants in Site 4, on May, July and November. (Adult females only on November.)

GNAPHOSIDAE: *Micaria ignea* ?: adults and juveniles were found under stones near colonies of ants in Sites 3,4, on March, April and May. *Pterotricha dalmasi*: adults and juveniles were sometimes found running among stones and mangrove's litter in Sites 2,3,4,5, on March, April, May, July and November.

LYCOSIDAE: 1♀ was found with her egg sac in Site 4, on November.

Fig. 2. Percentage of specimens of every spider family collected from Nabq Protectorate.



OXYOPIDAE: *Peucetia arabica*: on *Zygophyllum* and other plants, and once inside a wooden building, Sites 3,4.
PHILODROMIDAE: *Philodromus* sp.: 1♀ on Mangrove in Site 2 and on other plants in Sites 4,5. *Thanatus* ? 2♀ under stones in Site 3, on April.
PHOLCIDAE: *Holocnemus pluchei*: 1♀ with her egg mass, inside a wooden building in Site 3, on April.
Mogrus fulvovittatus: on plants and wanderers in Sites 3,4,5. *Myrmarachne tristis*: adults and juveniles on *Nitraria* trees and other plants in Sites 2,4,5, on May, July and November. *Thyene imperialis*: 1♂ on Mangrove plant in Site 2, on March.
TETRAGNATHIDAE: *Tetragnatha* sp.: 1 s♀ on her web on Mangrove plants in Site 6.
THERIDIIDAE: two species of genus *Latrodectus* were found in Site 4. A juvenile individual at the entrance of an empty small stony cave on November. It was reared until reaching maturity to be a male *Latrodectus pallidus*. The other specimen was adult female of *L. tredecimguttatus* inside her nest among plants on May. *Paidiscura dromedaria*: adults and juveniles on *Nitraria* trees and other plants in Sites 2,4,5, on March, May and November. This species was mostly collected by beating net method.
THOMISIDAE: *Synema diana*: on Mangrove and other plants in Sites 1,4,5. *Thomisus onustus*: on *Zygophyllum* and other plants in Sites 2,3,4,5.

II. Order **Pseudoscorpionida**

Six specimens, 2♂ + 4♀, of Family Olpiidae, *Minniza* cf. *hirsti* J.C. Chamberlin, 1930, were found under stones in Sites 3 and 4 (Wadi Kid) on April, May and November. Two females of Family Cheliferidae ? were found on *Nitraria* trees in Site 5 (North of Wadi Umm-Arak) on July and November.

III. Order **Scorpionida**

Three species of the same family of scorpions, Family Buthidae, were found under stones in Sites 3 and 4.

1. One *Compsobuthus werneri* (Birula, 1908) in Site 3, on March.
2. Two *Leiurus quinquestriatus* (Ehrenberg, 1828) in Site 3, on April and a third specimen in Site 4, on November.
3. Three *Orthochirus innesi* Simon, 1910 in Site 4, on May.

IV. Order **Solpugida**

Four males and three juveniles (?) of Family Daesiidae, *Biton ehrenbergi* Karsch, 1880, were attracted at night to artificial light and captured in Site 4, on May.

C. Abu Galoum protectorate

Abu Galum was declared as protected area by the Prime Ministerial Decree No. 1511 for 1992. Its area is about 500 km^2. Type: Landscape Protected Area.

The high basement complex coastal mountains well represented in this protected area contain many faunal and floral components characteristic of the hinterland of South Sinai. There are 44 endemic species among 165 plant species recorded from the protectorate. Nubian Ibex *Capra nubiana* is a prominent mammal species. Intact coral reefs fringe the coast in this section of the Gulf of Aqaba. The protected area plays an important role in regulating the land use along the Gulf of Aqaba coast, acts as a buffer zone between different development focal points along that coast, and protects the natural resources within the area which form the back bone of the region's economy.

Collecting Sites:

1. Mouth of Wadi Misk Al-`Abd, on gulf: 28º45'N 34º37'E
2. Mouth of Wadi Umm Afaii, on gulf: 28º43'N 34º37'E
3. Mouth of Wadi Rasasah, on gulf: 28º39'N 34º34'E
4. Wadi Hibiq, 9km north of Wadi Abu-Nafrah: 28º51'N 34º34'E
5. Wadi `Amoud, near Jabal Mukaymin: 28º42'N 34º34'E
6. Wadi Rasasah: 28º40'N 34º34'E
7. Al-`Umayyid: 28º37'N 34º33'E
8. End of Wadi Abu-Nafrah, west of Jabal Sukhn: 28º45'N 34º34'E

Dates of collecting: 15-17 July, 15-17 November 1994 & 18-19 May 1995.

I. Order **Araneida**

Spiders of sixteen families were collected from the eight studied sites. The identification of the collected specimens with their numbers, months of collecting and sites of collection are included in Table 3 and the percentage of specimens of every spider family is plotted in Fig. 3.

Table 3: Spiders collected from Abu Galoum protectorate (July 1994–May 1995).

Family	Species	Specimens	Sites	Months
Agelenidae	*Benoitia lepida*	1♂, 1♀, 3s♂, 23j	4	May, Jul
Araneidae	*Argiope* sp. *Cyrtophora citricola*	1j 1♂, 1♀, 1s♂, 1s♀, 4 j	4 1,3,4,5	May May, Jul, Nov
Eresidae	*Stegodyphus dufouri* *Stegodyphus* sp.	4♀ 1j	1 4	May Jul
Filistatidae	? sp.	1j	2	Nov
Gnaphosidae	*Pterotricha* sp. *Zelotes* sp. ? sp. (~2 spp.)	7j 1♂, 1j 1♀, 13j	3,4,5 2,8 2,3,4,8	May, Jul Jul, Nov May, Jul, Nov
Linyphiidae	? sp.	1j	7	Jul
Lycosidae	? sp.	1♂, 13j	2,4,5,7,8	May, Jul, Nov
Miturgidae	*Cheiracanthium* sp.	1j	5	May
Oecobiidae	*Oecobius templi* ? *Uroctea limbata*	1♀, 1s♂, 1s♀, 4j 1♂, 6j	4,5,6,8 3,4,5,7	May, Jul May, Jul, Nov
Oxyopidae	*Peucetia arabica*	1♂, 1♀, 1s♂, 8j	3,4,5	May, Jul, Nov
Philodromidae	*Philodromus* sp.	1s♂, 1♀, 11j	1,2,3,4,6,7	May, Jul, Nov
Salticidae	*Mogrus* sp. *Plexippus paykulli* ? sp. (~4 spp.)	1j 1♂ 4♂, 1♀, 23j	2 3 1,2,3,4,5,6,7	Jul May May, Jul, Nov
Sicariidae	*Loxosceles* sp.	1j	4	Nov
Theridiidae	? sp. (2 spp.)	2♀, 4j	1,4,5,7	May, Jul, Nov
Thomisidae	*Thomisus onustus* *Xysticus ferus* ?	1♂, 1♀, 1s♀, 11j 1♀, 1s♂, 1s♀, 4j	1,3,4,5,6,7 2,3,4,5,7	Jul, Nov May, Jul, Nov
Zodariidae	*Zodarion* sp.	1♀	3	May

Most spiders were found under stones. The other habitats and observations on some spider taxa, arranged alphabetically according to families, are as follows :

AGELENIDAE: *Benoitia lepida*: adults and juveniles were found on their peculiar funnel webs among plants in Site 4, on May and July.

ARANEIDAE: *Argiope* sp.: on its orb web, Site 4, on May. *Cyrtophora citricola*: adults and juveniles were found on their webs among plants in Sites 1,3,4,5.

ERESIDAE: *Stegodyphus dufouri*: 4♀ were found inside their nests on a wooden building in Site 1, on May.

OXYOPIDAE: *Peucetia arabica*: on plants in Sites 3,4,5.

PHILODROMIDAE: *Philodromus* sp.: on plants in Sites 1,2,3,4,6,7.

SALTICIDAE: *Mogrus* sp.: on plants in Site 2. *Plexippus paykulli*: 1♂ inside a wooden building in Site 3.
THOMISIDAE: *Thomisus onustus*: on plants in Sites 1,3,4,5,6,7.
ZODARIIDAE: *Zodarion* sp.: 1 ♀ was attracted at night to light in Site 3, on May.

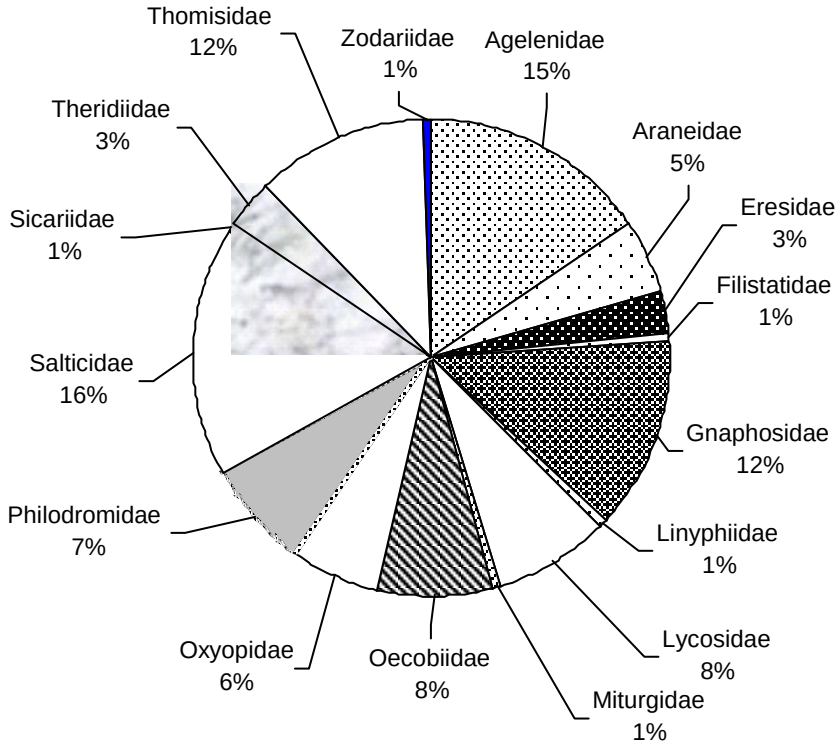


Fig. 3. Percentage of specimens of every spider family collected from Abu Galoum Protectorate.

II. Order **Pseudoscorpionida**

Nine pseudoscorpions of two families were found in sites 3 (Mouth of Wadi Rasasah) and 5 (Wadi `Amoud, near Jabal Mukaymin). Two males of Family Cheliferidae, *Rhacochelifer* sp., were found on *Acacia* trees in site 5 on May and November. The other seven specimens, 3♂ + 4♀, belong to Family Olpiidae, *Minniza* cf. *hirsti* J.C. Chamberlin, 1930; two of them were found in site 3 and five in site 5. All *Minniza* specimens were found under stones on November.

III. Order **Scorpionida**

Only one species of scorpions, *Leiurus quinquestriatus* (Ehrenberg, 1828), Family Buthidae, was found twice on July; in site 3 using Ultra Violet radiation and in site 8 (End of Wadi Abu-Nafrah, west of Jabal Sukhn) under a stone.

IV. Order **Solpugida**

Six juvenile solpugids of Family Daesiidae were found in sites 3 and 5. Two of genus *Blossiola* ? were attracted at night to light in site 3 on May and two others of the same genus were found under stones in site 5 on July. On November, a *Biton* sp. and a *Blossiola* ? sp. were found in site 3 under stones.

Alphabetical list of identified spider species

Argiope lobata (Pallas, 1772)
Benoitia lepida (O.P.-Cambridge, 1876)
Cyrtophora citricola (Forskål, 1775)
Heriaeus buffoni (Audouin, 1825)
Holocnemus pluchei (Scopoli, 1763)
Latrodectus pallidus O.P.-Cambridge, 1872
Latrodectus tredecimguttatus (Rossi, 1790)
Micaria ignea O.P.-Cambridge, 1872
Mogrus fulvovittatus Simon, 1882
Mogrus sinaicus Prószyński, 2000
Myrmarachne tristis (Simon, 1882)
Oecobius templi O.P.-Cambridge, 1876
Paidiscura dromedaria (Simon, 1880)
Peucetia arabica Simon, 1882
Philodromus sinaiticus Levy, 1977
Plexippus paykulli (Audouin, 1825)
Pterotricha conspersa (O.P.-Cambridge, 1872)
Pterotricha dalmasi Fage, 1929
Stegodyphus dufouri (Audouin, 1825)
Stegodyphus lineatus (Latreille, 1817)
Synema diana (Audouin, 1825)
Thomisus onustus Walckenaer, 1805
Thyene imperialis (Rossi, 1846)
Uroctea limbata (C.L.Koch, 1843)
Xysticus ferus (O.P.-Cambridge, 1872)

Discussion

Spiders, pseudoscorpions, scorpions and sun-spiders were studied for the first time in coastal protected areas of Egypt. All species, with few exceptions, were recorded for the first time from those areas (El-Hennawy, 1988, 1992, 1998, 2002a, 2002b and 2002c). This preliminary study led to the following notes:

1. Family Eresidae: *Stegodyphus dufouri* may be transferred with human beings. This species is widely distributed in the Nile Valley. It was found in Abu Galoum near a police camp.
2. Family Gnaphosidae: *Pterotricha conspersa* was recorded from Ras Mohammad while *P. dalmasi* was its counterpart in Nabq. The two species were widely distributed as well as their presence among Mangrove's litter.
3. Family Oecobiidae: *Uroctea limbata* was recorded from the three protected areas. It may be a variety or almost a subspecies of this palaearctic species.
4. Family Oxyopidae: *Peucetia arabica* is widely distributed on different kinds of plants in the three protected areas.
5. Family Salticidae: *Mogrus fulvovittatus* was recorded from Nabq, while *Mogrus sinaicus* was found in Ras Mohammad. The last species needs a study of more specimens, especially males, to be sure that it is a valid species and not a synonym to *M. fulvovittatus*. The epigynum of *M. sinaicus* is "closely resembling that of *M. fulvovittatus*" as its author himself stated (Prószyński, 2000), while the male of this species is still unknown.
6. Family Theridiidae: Two species of genus *Latrodectus* were recorded from Wadi Kid, Nabq protectorate. *L. pallidus* lives inside stony caves while *L. tredecimguttatus* lives among plants. Levy (1998) recorded *L. pallidus* from Sinai, but "there are no explicit records". He also recorded *L. tredecimguttatus* from the middle and south of Sinai without definite locality.
7. Family Thomisidae: *Xysticus ferus* ? female specimens are something similar to *Xysticus tristrami* (O.P.-Cambridge, 1872). The discovery of the male of this species may lead to a synonymy between the two species.
8. The pseudoscorpions of genus *Rhacochelifer*, Family Cheliferidae, are very similar to *R. similis* Beier, 1932 which was recorded from Libya and Siwa Oasis in western

desert of Egypt (Beier, 1932 & 1947). The confirmation of their identification needs more specimens.

This study leads us to state that it is necessary to make continuous seasonal survey of all arachnid species in the coastal protected areas of Egypt to elucidate their importance in their environment. A thing which enables the monitoring of these species in relation to the environmental changes which affect them in these areas.

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